

wherein when either of the first and second sets of color data is not output to said location on the flat panel display, the indicia on the flat panel display is in a color different from said another color; and

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a third central processor for receiving data from aircraft instruments related to the aircraft systems parameters and for interrogating the aircraft systems with simulated flight data on a statistical basis to build a database of statistical measurements of the aircraft systems for maintenance and diagnostic purposes.--

--19. A color flat panel display for displaying, to a crew in a cockpit in an aircraft, simulated aircraft flight instruments and aircraft system parameters related to data from aircraft instruments and indicia for indicating integrity of display data being received for display by the color flat panel display, comprising:

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a display screen on which at least one of the simulated aircraft instruments and said aircraft system parameters are displayed in a first color and said indicia are normally displayed in a single, predetermined, unchanging second color different from said first color such that any color change from said second color in said indicia normally displayed in said second color as a result of a change in indicia data fed to the display screen visually indicates reduced operating integrity of the display data and thereby visually alerts the crew to a possible problem with the displayed aircraft system parameters.--

REMARKS

The "final" Office Action mailed October 1, 2002 has been reviewed and carefully considered. Reconsideration of the claim rejections set forth in that Office Action, in view of the

within amendments to the claims and the following remarks, and entry of the within claim amendments, is respectfully requested.

At the outset, sincere appreciation is expressed for the courtesies extended by Examiner Nguyen at the personal interview with applicant's undersigned representative on January 16, 2003. In the course of that personal interview the features and functionality of the present invention, the proposed amended claims set forth herein (a copy of which was left with the Examiner at the conclusion of the interview), and the cited Hoffman et al. patent (U.S. Patent No. 5,543,939) were discussed. As is reflected in the Interview Summary prepared by the Examiner at the conclusion of the interview, agreement was reached with respect to the claims as so amended, the Examiner agreeing that the present invention as set forth in the amended claims patentably distinguishes over the disclosure and teachings of Hoffman et al.

The present invention provides a flat panel display system for displaying, to an aircraft flight crew in the cockpit of an aircraft, data relating to aircraft system parameters and like information commonly employed and consulted in the operation of the aircraft. In effect, the system of the invention receives data inputs from, for example, sensors and the flight data computers of the aircraft, and graphically displays that received data in a variety of formats including via graphically-simulated aircraft flight instruments that are electronically rendered or created on the display. Such graphically-simulated flight instruments may, for example, be presented to appear as conventional mechanical aircraft instrumentation such as altimeters, air speed indicators, vertical speed indicators, and directional gyroscopes and the like. Most significantly, the present invention provides to an aircraft flight crew member viewing the display an immediate and clearly apparent and irrefutable indication of possible problems in the integrity of the data that is being displayed. That is, the invention clearly and in an obvious manner alerts a viewer of the

display is there is a possible problem in the graphics display system of the invention such that, for example, the data which is provided to the display system by aircraft sensors and/or flight data computers might not be accurately presented on the graphically-simulated flight instruments or otherwise on the display screen of the inventive system. Put another way, a fault in the graphical display system - as a result of which the displayed data or indications on which the flight crew is relying to operate the aircraft may be in error and therefore should not be relied upon - is immediately and clearly conveyed to a viewer of the displayed data.

In a preferred embodiment of the invention as described in the specification, data (as for example parameter information from aircraft sensors and/or calculated by an air data computer of the aircraft) to be graphically displayed is presented to two independent central processors, each of which feeds a respective independent graphics generator for generating the indications to be displayed or rendered on the display screen. Thus, a first central processor receives such input data and delivers an output to a first graphics generator that is operatively coupled to the first central processor for generating a *first* set of colored data based on the input data received by the first central processor. The first graphics generator outputs that first set of color data to a location on the flat panel display for developing an image that is viewable by a user of the inventive system.

At the same time, a second central processor receives the input data and presents its output to a second graphics generator that is operatively coupled to the second central processor for generating a *second* set of color data based on the input data received by the second central processor. The second graphics generator outputs the second set of color data to the *same* location on the flat panel display but in a *different* color than the first set of color data that is output by the first graphics generator to that location. The resulting combination -- at the display location which has received the output from the first and the second graphics generators -- is combined at that

location to form, at that location, an image for viewing by the aircraft flight crew such that the resulting image is presented in another color different from the colors on the first and second sets of color data. Thus, unless each of the first and second graphic generators output, to the same location on the graphics display, the same display data but each in its proper respective color set, the resulting image that is presented at that location on the display to a viewer of the image will not be of the proper color. Put another way, if the image presented at a location on the display is not the proper color in which that image should be presented, or the color is observed to change from the proper or expected or normal color, then the aircraft flight crew member viewing the display will immediately and irrefutably observe and recognize that the integrity of the data being presented at that location may be in error due to a problem in the display system.

This may, by way of example, be implemented by generating a normally-gray ring or bezel surrounding a graphically-simulated flight instrument on the display; if the ring or bezel appears in any color other than gray, then the integrity of the data presented at that location by the graphics display system which feeds the display should be questioned.

In this manner, the present invention provides to the flight crew a clear and immediately-apparent indication of a possible fault in the display system through which the data received from aircraft instrumentation and/or flight data computers is graphically-rendered for viewing and use by the aircraft flight crew.

Independent claims 1, 13 and 19 have been amended for the sole purpose of further clarifying this functionality, which was believed to have already been present in the claims. Specifically, each of independent claims 1 and 13 has been amended to make it more clearly apparent that the different color outputs of the first and second graphic generators, to create an image of a third color, are output to the same location on the flat panel display. Similarly,

independent claim 19 has been amended to more clearly recited that a change -- of a displayed indication -- from a color in which the indication is normally displayed to a different color indicates reduced operating integrity of the display data and thereby visually alerts the aircraft crew to a possible problem with the displayed aircraft system parameters.

In contrast, the Hoffman et al. patent provides a computerized diagnostic and monitoring system in which different colors are used in different portions (i.e. locations) of the display to indicate to a viewer of the display the level of a particular displayed parameter. For example, and with reference by way of example to column 8, lines 12 *et seq* of the Hoffman et al. specification, each of the gauges 12 (see Fig. 1) "includes a plurality of indicating segments 16, high warning segments 18, and low warning segments 20. ... When it is desirable to indicate the level of a parameter for which it is advantageous to indicate a warning when the parameter exceeds a certain level, for example engine temperature, the high warning segments 18 are enabled. To indicate the level of a parameter for which it is advantageous to indicate a warning when the parameter is below a certain level, for example fuel level, the low warning segments 20 are enabled." Hoffman et al. further indicates that in their preferred embodiment, "The high and low warning segments 18, 20 are colored differently than the indicating segments 16; and the high and low outline segments 20, 24 are colored differently from the central outline segments 23 and similarly to the high and low segments 18, 20. Advantageously, the high and low warning segments 18, 20 and high and low outline segments 20, 24 are red and the indicating segments 16 and central outline segments 23 are blue-green." Thus, Hoffman et al. uses the appearance of the gauge 12, and in a preferred embodiment the colors of the segments, to indicate that a display parameter is currently at either a high or low warning level or is within normal range.

A first important difference to be recognized between the system and disclosure of Hoffman et al. and the present invention is that Hoffman et al. is not directed to informing the user of a possible fault in the display system or that the information being presented on the display is potentially suspect by virtue of a fault in that system. The integrity of the data itself is never in issue in Hoffman et al.; Hoffman et al. merely provides an indication that a particular parameter is currently either within, or is currently above or below, its normal or most-desired level within its operating range.

Moreover, none of the segment indications in Hoffman et al. are configured, or are operable, to change color from one color to another color under any sort of fault or indication conditions or, indeed, for any purpose at all. In the present invention, a location on the display normally appears in a particular color; when that location appears in a different color, a possible fault in the graphics display is thereby indicated, informing the viewer that the data or indication provided at that display location may be incorrect and, accordingly, should not be relied upon -- at least without or subject to further investigation. In Hoffman et al., on the other hand, any particular display location presented to the viewer is either illuminated in a single predefined color, or is nonilluminated or unlit.

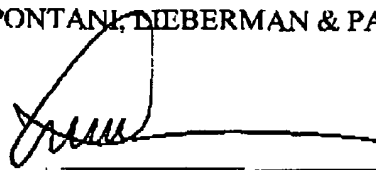
Applicant therefore respectfully submits that the present invention, as recited in the claims now pending the application, patentably distinguishes over the Hoffman et al. patent teachings and, indeed, over the disclosure and teachings of all prior art that is known to applicant.

Reconsideration and withdrawal of the rejections set forth in the Office Action of October 1, 2002, and early issuance of a formal Notice of Allowance, are accordingly once more solicited.

Respectfully submitted,

COHEN, PONTANI, LIEBERMAN & PAVANE

By


Lance J. Lieberman
Reg. No. 28,437
551 Fifth Avenue, Suite 1210
New York, New York 10176
(212) 687-2770

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AMENDMENTS TO THE CLAIMS SHOWING CHANGES

Kindly amend claims 1, 13 and 19 as follows:

--1. (Twice Amended) A flat panel display system for displaying data relating to aircraft system parameters from corresponding aircraft instruments to a flight crew in a cockpit of an aircraft, comprising:

a flat panel display for visually displaying the aircraft system parameters on simulated instruments found on the flat panel display and for displaying indicia that said data is being received related to the aircraft system parameters from corresponding aircraft instruments;

a first central processor for receiving said data from the aircraft instruments measuring said aircraft system parameters;

a first graphics generator operatively coupled to the first central processor for generating a first set of color data as a function of the data received by the first central processor and for outputting the first set of color data to a location on the flat panel display so that the flat panel display can form the simulated instruments and the indicia;

a second central processor for receiving said data from the aircraft instruments measuring said aircraft system parameters; and

a second graphics generator operatively coupled to the second central processor for generating a second set of color data as a function of the data received by the second central processor and for outputting the second set of color data to said location on the flat panel display in a different color than said first set of color data so that the combination at said location of the first set of color data from the first graphics generator and the second set of color data from the second graphics generator forms at said location on the flat panel display [can form with the

output from the first graphics generator] the simulated instruments and the indicia such that [wherein] said indicia is of another color different from the colors of said first and second sets of color data,

wherein when either of the first and second [set] sets of color data is not output to said location on the flat panel display, the indicia on the flat panel display is in a color different from said another color.--

--13. (Twice Amended) A circuit for controlling a flat panel display that displays on simulated aircraft instruments data related to aircraft system parameters gathered from aircraft instruments and indicia that show that the data is being received by the flat panel display, comprising:

a first central processor for receiving said data from the aircraft instruments measuring said aircraft system parameters;

a first graphics generator operatively coupled to the first central processor for generating a first set of color data as a function of the data received by the first central processor and for outputting the first set of color data to a location on the flat panel display so that the flat panel display can form the simulated instruments and the indicia;

a second central processor for receiving said data from the aircraft instruments measuring said aircraft system parameters;

a second graphics generator operatively coupled to the second central processor for generating a second set of color data as a function of the data received by the second central processor and for outputting the second set of color data to said location on the flat panel display in a different color than said first set of color data so that the combination at said location of the

first set of color data from the first graphics generator and the second set of color data from the second graphics generator forms at said location on the flat panel display [can form with the output from the first graphics generator] the simulated instruments and the indicia such that [wherein] said indicia is of another color different from the colors of said first and second sets of color data,

wherein when either of the first and second [set] sets of color data is not output to said location on the flat panel display, the indicia on the flat panel display is in a color different from said another color; and

a third central processor for receiving data from aircraft instruments related to the aircraft systems parameters and for interrogating the aircraft systems with simulated flight data on a statistical basis to build a database of statistical measurements of the aircraft systems for maintenance and diagnostic purposes.--

--19. (Amended) A color flat panel display for displaying, to a crew in a cockpit in an aircraft, simulated aircraft flight instruments and aircraft system parameters related to data from aircraft instruments and indicia for indicating integrity of display data being received for display by the color flat panel display, comprising:

a display screen on which at least one of the simulated aircraft instruments and said aircraft system parameters are displayed in a first color and said indicia are normally displayed in a single, predetermined, unchanging second color different from said first color such that any color change from said second color in said indicia [from] normally displayed in said second color as a result of a change in indicia data fed to the display screen visually indicates

reduced operating integrity of the display data and thereby visually alerts the crew to a possible problem with the displayed aircraft system parameters.--